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GENERAL SCIENCE SITUATION IN IOWA AND CALIFORNIA

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Whether in favor of a first-year general science course for the high school or not, anyone well informed upon the subject will admit that in many cases the special science courses in the first years of the high school have not proved satisfactory. The following is a report of an investigation carried on under the direction of Dr. Otis W. Caldwell, and is one of several investigations which bear upon the organization of high-school science. This study was not an attempt to solve the problem, but an endeavor to find the facts as they exist, directly from the people at work in secondary education. These are the people who are in a position to know the real needs of the pupils and who should be the ones to find the ultimate solution.

The questionnaire method was used, not because it is free from error, but because it seemed to be the best way to obtain the desired information. The nature of the questions will appear from the tables. The answers from Iowa were nearly all received during the last two months of 1914; those from California during the early part of 1915.

Two states, widely separated geographically, were selected. With one or two exceptions the questions sent to the two states were the same. In Iowa the course has been introduced recently. In California the work has been given since 1906. The widespread interest in both states has been shown by the large number of answers received, as well as by numerous personal letters from teachers and superintendents.

In Table I will be found the number of letters sent out, the number of replies, and the number of schools offering general science. Table II gives the date of introduction in the two states. Table III shows that in these localities general science may be considered as

a first-year subject. As would be expected from a new course introduced in the first year, as yet many of these schools permit

TABLE I

ENROLMENT	NO. OF LETTERS		NO. OF ANSWERS		NO. HAVING GENERAL SCIENCE	
1913-14	Iowa	California	Iowa	California	Iowa	California
200+.....	40	55	30	50	11	25
100-199.....	87	53	61	47	11	28
50-99.....	71	71	44	61	9	27
49-.....	30	46	18	38	2	19
Total.....	228	225	153	196	33	99

TABLE II

DATE OF INTRODUCTION OF GENERAL SCIENCE

CALIFORNIA		CALIFORNIA		IOWA	
Date	No. of Schools	Date	No. of Schools	Date	No. of Schools
1906.....	1	1912.....	22	1911.....	1
1907.....	1	1913.....	19	1912.....	3
1908.....	2	1914.....	15	1913.....	9
1909.....	0	1915.....	6	1915.....	20
1910.....	19	Unknown.....	10		
1911.....	4				

TABLE III

YEAR IN WHICH GENERAL SCIENCES IS GIVEN

	No. OF SCHOOLS	
	Iowa	California
Number of schools offering general science in first year.....	31	84
“ “ “ “ “ “ “ first or second year.....		12
“ “ “ “ “ “ “ second year.....		2
“ “ “ “ “ “ “ second or third year.....	1	.....
“ “ “ “ “ “ “ third year.....	1	.....
“ “ “ “ “ “ “ fourth year.....		.....
“ “ “ admitting pupils from other than the regular years.....	20	87
Number of schools not so admitting other pupils.....	13	10

other than first-year pupils to enter. Table IV may perhaps show a tendency, with longer experience, toward a full-year course, while

Table V indicates a very unsettled condition regarding the amount of time per week which the work receives. Table VI points to the acceptance of the field and laboratory method. In Table VII we see

TABLE IV
TIME PER YEAR GIVEN TO GENERAL SCIENCE

	No. OF SCHOOLS	
	Iowa	California
Number of schools offering general science one year.	12	82
" " " " " " one-half year.	21	8

TABLE V
TIME PER WEEK GIVEN TO GENERAL SCIENCE

	No. OF SCHOOLS	
	Iowa	California
Number of schools offering general science 1 hour per week.		1
" " " " " " 3 hours " " " "	2	2
" " " " " " 3½ " " " "		3
" " " " " " 4 " " " "	29	8
" " " " " " 5 " " " "	2	19
" " " " " " 6-7 " " " "		6
" " " " " " 7 " " " "		1
" " " " " " 8 " " " "		19
" " " " " " 9 " " " "		
" " " " " " 10 " " " "		

TABLE VI
LABORATORY AND FIELD WORK

	No. OF SCHOOLS	
	Iowa	California
Number of schools offering laboratory work.	30	97
" " " " " field work.	19	82
" " " " " field and laboratory work.	15	82
" " " " " neither field nor laboratory work.	3	

that in a majority of cases there has been no recognized displacement of other subjects. One of the objections which has sometimes been offered against the introduction of general science is that the

teacher must be more broadly trained than is required for the old plan of special science courses. A glance at Table VIII will show

TABLE VII
SUBJECTS DISPLACED BY GENERAL SCIENCE

SUBJECT	No. OF SCHOOLS	
	Iowa	California
Botany.....	1	2
Commercial geography.....	1	.....
Latin.....	3	.....
Physical geography.....	6	35
Physics.....	1	.....
Zoölogy.....	2	.....
None.....	15	62
Not mentioned.....	4	.....

TABLE VIII
SUBJECTS NOW BEING TAUGHT BY TEACHERS OF GENERAL SCIENCE IN IOWA

Subjects	No. of Teachers
General science, algebra, and bookkeeping.....	1
“ “ physics, and mathematics.....	2
“ “ “ physiology, and geometry.....	1
“ “ “ and physiology.....	4
“ “ “ and history.....	1
“ “ “ botany, and algebra.....	1
“ “ “ and Latin.....	1
“ “ “ and English.....	1
“ “ “ Latin, and English.....	1
“ “ “ and agriculture.....	1
“ “ “ agriculture, physiology, physical, geography, and botany.....	1
“ “ “ botany, zoölogy, and geology.....	1
“ “ “ physical, geography, and agriculture.....	2
“ “ “ domestic science, and agriculture.....	1
“ “ and mathematics.....	1
“ “ manual training, and agriculture.....	1
“ “ “ geometry, and athletics.....	1
“ “ mathematics, and other science.....	1
“ “ chemistry, and agriculture.....	1
“ “ and chemistry.....	1
“ “ “ agriculture.....	1
“ “ “ domestic science.....	1
“ “ “ other science.....	1

what subjects the science teachers of Iowa are now teaching—anywhere from one to five other subjects require a considerable degree

of "broadness" of training without regard to the general science. By mistake this question was omitted from the papers sent to California. In Table IX will be found a summary of opinions given. In nearly every case where the subject has been dropped, the reason given was lack of a suitable text or of a competent teacher. In no case was dissatisfaction with the course itself given as the reason.

TABLE IX
OPINIONS REGARDING GENERAL SCIENCE

	No. of Schools	
	Iowa	California
Number of answers in favor of general science.	103	155
" " " not in favor of general science.	13	27
" " " not giving an opinion.	37	13
" " schools expecting to introduce general science in the near future.	19	10
Number of schools having dropped general science. . . . .	.....	15

Those to whom the letters were sent were asked to give their opinions about the course but were not asked to give reasons for the opinions. I have attempted to classify these replies, in so far as was possible, placing the ideas stated in the same or similar words together. Since there was no special difference in the answers from the two states, I have not given them separately.

OPINIONS REGARDING GENERAL SCIENCE

	No. of Answers
"Fine for those who take other science, because it lays a good foundation and makes the pupil familiar with scientific method."	65
"Fine for those who take no other science in later years, or those who leave early, because it gives general information."	35
"Good for all. Gives survey of whole field."	4
"Holds boys better than any other course offered."	2
"Interests boys otherwise backward."	1
"Reaches many pupils with general science knowledge not otherwise reached."	2
"Does more for pupils who leave early than does physiography." . . .	1
"Keeps pupils in school."	2
"Valuable where little science is given."	2
"Stimulates desire to know more science, and increases size of later science classes."	8

	No. of Answers
"Good for technical schools."	2
"Good for night schools."	1
"Good preparation for agriculture."	6
"Helps pupil to select future work."	5
"Practical and adapted to local needs."	7
"Explains common phenomena without too much detail."	7
"Causes pupils to think and observe."	6
"It is mind-broadening."	1
"An informational course."	6
"Has human interest and great educational value."	5
"Best and most economical course a school can offer."	1
"Pupils are much interested."	12
"It teaches self-reliance."	1
"It connects classwork with applied science."	2
"It correlates the various sciences."	3
"The teacher must be broadly trained."	41
"Would teach it if it were possible under our conditions of few teachers and poor equipment."	1
"Of great value in the eighth grade."	3
Those who gave lack of text as the reason for not having the course. .	4
"Too general."	9
"Not complete."	2
"Lacks unity and continuity of a basic subject."	8
"A smattering of everything."	7
"Not standardized."	1
"Out of harmony with present tendency of specific courses."	1
"Poor substitute for special courses."	1
"Physiography is more definite."	5
"Not as good as physiography with the emphasis on the human side." .	1
"Not as good as physiography for a small high school."	1
"No need for it."	1
"There is no such thing."	1
"With agriculture we do not need it."	4
"Agriculture better adapted to local needs."	1
"Poor now because of lack of prepared teachers and good texts."	13
"Colleges do not credit it."	2
"Cannot have everything and we must meet university requirements." .	1